WILDLIFE MANAGEMENT

Project title: Winter Wolf Predation Rates and Prey Selection in an Elk-Bison System in Yellowstone National Park

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Objective: The goals of this study were to quantify wolf predation rates and prey selection, and assess wolf predation impacts on the ungulate populations in the Madison, Firehole, and Gibbon drainages of Yellowstone National Park. Specific objectives included: 1) estimate time ungulates were subjected to wolf predation; 2) estimate winter ungulate abundance and composition; 3) estimate temporal patterns in predation, within and between winters; 4) describe prey selection patterns; and 5) estimate total ungulate offtake by wolves according to species, sex, and age class.

Findings: Data collection is complete and the thesis is being written for this study. Data were collected from November through May in the 1998-1999 and 1999-2000 winters. Triangulation and daily ground tracking of wolves was performed to collect data on wolf distribution and abundance, and locate kills. Necropsies were performed to ascertain species, sex, and age of kills to study wolf prey selection, and locations of kills were recorded to examine kill distribution. Ancillary data collected to investigate factors contributing to prey vulnerability included landscape attributes at kill, encounter, and failed attempt sites, and condition of prey. The amount of data collected was determined by daily wolf activity.

In the two years of study, wolves were monitored for a total of 345 days, radio signals were detected 218 days, and attempts to find wolf tracks off-road were made 178 days. Wolf tracks were followed and travel routes recorded 167 days for a total of 628 km. Areas of high use by wolves both years were Nez Perce Creek, Firehole Lake Drive, Twin Buttes, Sentinel Meadows, and Rabbit Creek.

The wolf preybase consisted of 300-900 bison and approximately 700 elk both winters. Eighty nine definite and 26 probable wolf kills were located during the study, including 59 elk calves, 31 cow elk, 10 bull elk, 1 unknown adult elk, and 15 bison: 13 calves, 1 cow and 1 unknown, totaling 115. Continuous non-denning season (mid-Novemberto mid-April) predation rates calculated for 98-99 and 99-00 winters showed an increase throughout both winters, with consistantly higher predation rates in the first winter compared to the second. Elk calves were the major prey item in both winters and prey switching was evident in both years. In the 1998-1999 winter, elk calves were taken at a steady increase November through February, decreasing in March. Adult elk and bison calves were taken at low levels all winter until increasing in March and April when elk calf kills began tapering. In the 1999-2000 winter, wolves began making kills in the study area later in the season than the previous year. Elk calves were taken consistently from

February through mid- March, decreasing in mid-April, while cow elk were taken increasingly throughout the winter. Bull elk and bison were negligible as prey items the second winter. Differences between winters included snow pack, above average in 1998-1999 verses below average in 1999-2000, and wolf pack size, 7 and 13 animals. Estimated prey offtake will be used to determine impacts of wolf predation on the ungulate population dynamics.

Project title: Winter Recreation Effects on Wildlife in Yellowstone National Park

Principal investigator: Dr. Robert Garrott
Contact: see above

Additional investigator(s): Dr. Scott Creel, Amanda Hardy

Objective: Our objective was to assess effects of winter recreation on wildlife populations in the Madison-Firehole-Gibbon drainages of Yellowstone National Park. We examined elk and bison distribution in relation to the winter road system, behavior, and stress hormone levels, along with winter season human activity types and levels. We compared distribution and behavior to similar data from a study conducted 20 years prior by K. Aune assessing winter recreation impacts on wildlife when winter visitation to YNP was significantly lower than current levels. Additionally, we compare behavior, distribution, and stress hormone levels to variation in human activity within the 1998-1999 and 1999-2000 winter season.

Findings: In the 1998-99 and 1999-2000 winter seasons, we collected data in the Madison-Gibbon-Firehole drainages of YNP. We repeatedly located 30-40 radio-collared cow elk and conducted bison surveys to obtain distribution and behavioral data relative to winter recreational activity. We collected fecal and snow-urine samples from radio-collared elk, unknown elk and unknown bison for analysis of glucocorticoid levels (a stress hormone indicator). We also conducted road, trail, and off-trail surveys documenting elk, bison, coyote, deer, moose, trumpeter swan and bald eagle sightings, along with group size, distance from road or trail, behavioral responses to human activity, and types of human activities present at each sighting. We have completed the lab work to derive fecal glucocorticoid levels and have compiled all field data for analysis. We are currently analyzing data and writing up our results. We have contributed one season of radio-collared cow elk stress hormone results and co-authored a paper for publication in Conservation Biology (paper pending acceptance as of February 2001). We plan to submit our completed findings to the NPS and for publication in Journal of Wildlife Management by the end of the summer (2001).

Project title: Coyote Density on Pronghorn and Bighorn Sheep Winter Range

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Additional investigator(s): McCrea Cobb

Objective: The Yellowstone pronghorn antelope herd is a historically and genetically significant group of animals that has served as a source for re-establishing pronghorn populations in other western states. During recent years, these antelope have experienced a precipitous decline in population. Several past studies support the conclusion that coyote predation can exert limiting influences on pronghorn populations. Little is currently known about the coyote populations inhabiting the Yellowstone pronghorns' critical winter range. The goal of this study is to estimate the density and numbers of coyotes and coyote packs in the Mammoth-Gardiner area using artificial howling surveys and scat transect surveys.

Findings: This study was approved and conducted during the winter and summer of 2000 and a similar study was conducted during the winter of 1998. During these studies, researchers identified and estimated the number of coyote packs in the study area. These past studies provide good data for comparison with the information gathered during continued surveys. We hope to repeat these studies using fundamentally identical methods this winter in order to build a database of information on coyote distribution and abundance in the study area.

Project title: Determining Bison Response to Mock Vaccination Approaches for Evaluating the Feasibility of a Remote Vaccination Program in Yellowstone National Park: Phase I

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Objective: We will conduct a series of mock vaccination approaches on Yellowstone bison during which we will measure the frequency and distance of flight, neutral reactions, or aggressive reactions of bison in response to these approaches. We will attempt to describe the relationship between bison behavioral reactions and field operational parameters (e.g. herd composition, number of personnel, mode of travel, distance to animals, weather, and location).

Findings: The primary product of Phase I is to determine the closest distance that park staff can safely approach bison on foot, horseback, snowshoe, vehicle, and snowmobile during each of the four sampling seasons while simultaneously minimizing stimulation of bison flight or aggressive responses. These data will then be incorporated into the development of optimum ballistic specifications (muzzle velocity, range, accuracy) for a remote vaccination gun. A final report will be generated by January, 2002.

Project Title: Epidemiology and Pathogenesis of Brucellosis in Yellowstone National Park Bison

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Objective: Determine the natural course of brucellosis in free-ranging bison. Determine modes of transmission. Provide information on the prevalence of infection and abortion.

Findings: We currently have 36 collared bison entering the sixth year of this project. Our focus will be on younger female bison coming into their first reproductive years, and on obtaining additional birth site information. Based on data we have collected to date bison apparently develop clinical brucellosis during their first pregnancy after exposure to the bacteria. Repeat reproductive failures, induced by brucellosis, appear to be uncommon. We have already begun removing radiocollars in 2000, and expect to remove more in February and spring months of 2001. The project will be completed and all radios will be removed in the fall of 2001.

Project title: Physiological Stress Responses, Aggression and Social Dominance in Yellowstone Wolves

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Additional investigator(s): Jennifer Sands

Objective: 1) Determine factors that affect stress hormone levels(glucocorticoids) in free-ranging wolves. This includes behavioral, ecological and anthropogenic influences; 2) Relate stress physiology to survival and reproduction; and 3) Relate stress physiology to social status.

Findings: We conducted two full winter seasons of field research in the winter of 1998-1999 and 1999-2000. We also continued field research this fall from November 2000 to February 2001. We have collected approximately 500 fecal samples since January 1999 from both known individuals, and where this was not possible, known pack. We have collected 500+ hours of observations of wolves that we are analyzing for

rates of aggressive interactions and dominance relationships. Our research has focused on the Druid, Rose Creek and Leopold packs in the Northern range of the park. We have finished running the glucocorticoid(GC) radioimmunoassays of the fecal samples collected and are beginning to analyze this data. We are currently conducting DNA analysis of fecal samples to determine genotypes and assign samples to specific individuals. We will also run radioimmunoassays for sex steroids (estrogen, estradiol and testosterone) beginning this spring. Our preliminary analysis indicates that higher ranking animals, in all three packs for both years studied, have higher GC levels than subordinates. Rank is a good indicator of GC levels, whereas rates of aggression are not. We will continue to examine other social, physiological, demographic and environmental variables and their association with GC levels.